CONTROL DATA® CYBER 70™
SCOPE OPERATING SYSTEM
For CYBER 70 Series/Models 72, 73 and 74

The CONTROL DATA SCOPE Operating System enables the user to make efficient use of the CDC® CYBER 70 Series/Models 72, 73 and 74 Computer Systems. SCOPE is oriented toward multiprocessing and multiprogramming, and the support of remote terminals.

The unique architecture of the CYBER 70 Series is supported by the distributive processing concepts of the SCOPE operating system. The central processor unit (CPU) is designed for high-speed computation, and peripheral processor units (PPU's) handle input/output and control functions. Central memory (CM) provide storage for programs and tables used for communication between components of the operating system. Extended core storage (ECS) can be used as an adjunct to central memory and as an allocatable storage device. In addition to supporting these major hardware components, SCOPE is the control center for all peripheral equipment.

The SCOPE Operating System is controlled by a monitor whose functions are distributed among CPU and PPU programs. The integrated scheduler swaps jobs in and out of central memory, to ECS or system mass storage, depending on resource requirements, availabilities, and job priorities. SCOPE enables additional jobs of up to 15 user jobs in central memory at one time; additional jobs may be held in ECS or mass storage, and swapped to the action central memory file in fractions of a second.

The monitor controls the central processor execution of user jobs from central memory and switches the CPU from one job to another when input/output is performed as job priorities dictate. The monitor also directs programs to be loaded into the PPU's, to execute I/O operations, or other control functions.

The SCOPE Operating System and its product set stress the following:

Overall System Performance
- Use of Extended Core Storage (ECS) for swapping and buffering of I/O between mass storage and central memory
- Fast loading
- Immediate access to libraries
- An integrated scheduler to optimize utilization of systems elements
- Support of up to 15 control points for multiprogramming
- System allocation of mass storage
- Advanced compiler products

More Remote Capability
- Broad support for terminals
- Multi-user capability for a single program
- Remote graphic support
- Time-critical capability

More User-Oriented Features
- Library features
- Increased loader flexibility
- Improved permanent file support
- Full ANSI COBOL

Extended Core Storage (ECS)

Extended core storage is supported in several ways. ECS is optionally used as an adjunct to main memory, providing CYBER 70 Series a true hierarchy of storage levels. ECS can also be utilized as an allocatable storage device. Any CYBER 70 Series/Model 72, 73 or 74 installation can determine how much ECS should be allotted to each of several uses:

• Library residence
• Direct use by user programs
• Residency of files
• Input/output buffering of mass storage files
• Automatic job swapping

These features provide the smaller central memory CYBER Models with more of the capabilities of larger central memory models.

Integrated Scheduler — Provides a coordinated approach to hardware/software resource allocation. It provides for the dynamic allocation of control points and central memory between conversational timesharing, interactive graphics, remote batch, and local batch processing. This also includes full automatic swapping in and swapping out of jobs, using ECS when it is available. The scheduler allows extensive flexibility in assigning job priorities, permitting the most critical jobs to be completed earlier, and allows resources of the system to be utilized more efficiently.

The Loader — Under the SCOPE Operating System, two distinct loading capabilities are available. The first is the ability to perform fast, efficient loading. The second is to provide for the loading of jobs with complex overlay structures.

In addition, the link-loading capability of competitive computers is available for conversation/coexistence with selected non-Control Data systems.

Library Organization — Allows multiple directories, each of which is logically independent from the others. Each library and its associated directory can be a permanent file, and one or more of these permanent files can be the current system library. Additional permanent files may be formed and identified as user libraries.

Tape Scheduling — Includes comprehensive prescheduling capabilities. This control measure is provided by allowing the user program the use of systems resources, only if all required tapes have been mounted.

Control Points — An installation can have from up to 15 individual programs under control of SCOPE. This feature provides flexibility to structure SCOPE to a particular installation's requirements.

Supports 20 PPU's and 24 I/O Channels — This capability allows for expanded peripheral configurations and remote networks, to be connected with the system.

Real-Time Capability — The SCOPE Operating System supports a time-critical monitor (RTM) package consisting of peripheral processor and central processor programs.

SCOPE and its communications software, INTERCOM, will support the new data communications sub-system (7077-1/791-1). This supports interactive terminals with distribution of the communications input/output functions to the stations in lieu of the central processor. In-terface of this type promotes availability of peripheral processors with attendant capability in multiprogramming and overall throughput. In addition, station software allows a CDC CYBER Series 70/Model 72, 73 or 74 to become a station for the CDC 7600 or CYBER 70/Model 76.

An extensive product set of compilers are available to the SCOPE User:

• ALGOL (ALGOL-60 Revised Report)
• BASIC
• COBOL (full ANSI level 3)
• COMPASS Assembly Language
• FORTRAN (run) Compile-to-core, USAS x 3.0 — 1966
• FORTRAN EXTENDED (USAS x 3.9 1966)
• FORM (File organizer and Record Manager)
• QUERY/UPDATE
• RECORD MANAGER
• SCOPE ADVANCED ACCESS METHODS (SAAM)
• SORT/MERGE
• OPHELIE II, OPHELIE MIXED (Linear Programming)
• SIMSCRIPT
• SIMULA
• INTERACTIVE GRAPHICS (part of INTERCOM)
• PERT/TIME
• APT (IITRI Version 9)
• INTERCOM Timesharing Software (Interactive terminals, remote batch terminals)

These product set members permit CYBER 70 Systems to excell in a broad variety of data processing, data management, and scientific applications. Timesharing and communications capability under INTERCOM complement these capabilities. Any application can be written as a multi-user job under INTERCOM, and can be used interactively by many users simultaneously. INTERCOM also provides modularity which allows additional terminals to be supported in the future.

Data Management — SCOPE and its logical Record Manager provide facilities for sequential index sequential, and direct access files, including four blocking methods and eight record types. Index sequential and direct access files are supported by SCOPE Advanced Access Methods (SAAM) which is composed of extension modules of the Record Manager. Inverted file handling techniques are available in a separate data management system. A Query/Update language is available for file interrogation and updating in a batch mode or from a terminal. File Organizer and Record Manager (FORM) provides a comprehensive group of file utility and data conversion routines. FORM can copy files, modify blocking and record formats, alter file organizations, select records, reformat selected records, and connect entire files from other manufacturers' systems.

The SCOPE Data Management software has the modularity to permit individualized tailoring by a user to meet specific data management requirements.

The SCOPE Operating System provides the CYBER 70 Series/Models 72, 73 or 74 Computer Systems with a modular and versatile system, which has been established from proven techniques. SCOPE takes advantage of the unique hardware architecture of the CYBER 70 Series and offers the flexibility for long-range growth.